STEEL
Project Fact Sheet

Energy-Efficient Process for Hot-Dip Batch Galvanizing

Lead-free zinc coatings save energy and waste

Benefits

- The ability to produce defect-free and lead-free zinc coatings
- Productivity increase of 20-30%
- Significant reduction of energy costs
- Reductions in dross, top ash, and smoke
- Coating thickness reduction by 10-50%
- Elimination of top flux use on the kettle
- Increase in expected kettle life span

Applications

Steel is a component of a wide range of products and makes up the building blocks of the construction, automotive, and machinery industries, among many others. Coating steel products to protect them is a popular practice which stands to grow even more with the development of high-quality lead-free coating processes

Hot-dip galvanizing of steel sheets, pipes, wires and other fabrication items is and will stay for the foreseen future one of the most important methods of corrosion protection. In spite of that, the galvanizing technology in many cases is extremely outdated. After fluxing, wet steel parts are immersed in molten zinc creating dangerous splashes, and excessive fume and ash formation. Energy consumption is high and kettle productivity is low, because items are heated in molten zinc from near ambient temperature to 450°C (840°F). Very often zinc coating contains lead, which after being dissolved in water finds its way into the human body and accumulates there with deleterious results.

Ferro Technologies, Inc. is demonstrating an energy saving and lead-free batch galvanizing technology. The new Thermaprep® process includes preheating steel parts in a separate furnace to 250-315°C (480-600°F) before immersion in a zinc kettle, which dramatically saves heat energy. The proprietary thermally stable flux protects steel surface from oxidation during preheating. The time of actual galvanizing is significantly reduced and equipment productivity increased. No lead is added to the kettle.

Hot Dip Batch Galvanizing is Clean, Efficient

In the Thermaprep® process, demonstrated by Ferro Technologies, Inc., steel parts are preheated in a separate furnace and then immersed in molten, lead-free zinc, which saves energy, increases productivity, and reduces defects.

Technology Advantages

The new technology provides hot-dip batch galvanizers with the following advantages: (1) a 20%-30% productivity increase; (2) significant energy cost reduction; (3) dross, top ash, and smoke reduction; (4) 10%-50% coating thickness reduction to meet specification requirement; (5) elimination of top-flux use on the kettle; (6) the ability to produce defect-free and lead-free zinc coatings; and (7) increased kettle life.

Current Status

The equipment is in place at the Laclede steel plant in Alton, IL, and Ferro Technologies is currently optimizing the system. The kettle handling system is being redesigned to reduce pipe immersion time. Ferro Technologies demonstrated the system to DOE personnel in March, 1998.

Energy Savings per Unit* (projected)

Current Energy Use (Btu)		1 billion
With Proposed Technology		486 million
	Energy Savings	514 million

Waste Savings per Unit* (projected)

Current Waste (tons)		3,800
With Proposed Technology		2,500
	Waste Savings	1,300

Economic Savings per Unit* (projected)

Current Costs		$1.194 million
With Proposed Technology		$807,600
	Cost Savings	$386,400

***for a facility galvanizing 6,960 tons of steel per year**

Industries of the Future—Steel

Through OIT's Industries of the Future initiative, the Steel Association, on behalf of the steel industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, ***The Re-emergent Steel Industry: Industry/Government Partnerships for the Future.***

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NICE^3—**N**ational **I**ndustrial **C**ompetitiveness through **E**nergy, **E**nvironment and **E**conomics is an innovative, cost-sharing program that promotes energy efficiency, clean production, and economic competitiveness in industry. This U.S. Department of Energy (DOE), Office of Industrial Technologies grant program provides financial assistance of up to $525,000 to state and industry partnerships for projects that demonstrate advances in energy efficiency and clean production technologies. The industrial partner may receive a maximum of $500,000 in federal funding. Non-federal cost share must be at least 50% of the total cost of the project.

Project Partners

Ferro Technologies Inc., Pittsburgh, PA

LaClede Steel Company, Alton, IL

Pennsylvania Department of Environmental Protection

Advanced Thermal Dynamics, Inc., Liberty, OH

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